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READINESS OF CLASS TEACHERS IN IMPLEMENTING ARTIFICIAL INTELLIGENCE-BASED LEARNING AT SD NEGERI 08 PANYABUNGAN

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Abstract

The development of Artificial Intelligence (AI) in education requires teachers to demonstrate digital readiness to support more effective, personalized, and interactive learning. However, AI-based learning at SD Negeri 08 Panyabungan remains limited, indicating the need for further investigation into teachers' preparedness and implementation practices. This study aims to examine teachers' understanding and readiness for AI, analyze its application in classroom learning, and identify the supporting and inhibiting factors affecting AI implementation at SD Negeri 08 Panyabungan. A qualitative approach was employed, with data obtained from the principal, teachers, students, and relevant documents. Data were collected through observation, interviews, and documentation, then analyzed using the Miles and Huberman model. Data validity was ensured through triangulation of sources, techniques, and time. The findings show that teachers possess an initial understanding of AI, but their readiness and classroom implementation remain limited and are still developing. AI use is generally indirect and limited to simple digital media rather than fully integrated AI-based learning practices. Key inhibiting factors include limited facilities, unstable internet access, and insufficient teacher training, while the existing use of digital media provides an initial foundation

for future development. This study concludes that SD Negeri 08 Panyabungan is still in the early transition stage toward AI-based learning. The study contributes to the discourse on digital transformation in elementary education by highlighting the need for systematic teacher training, adequate infrastructure, and institutional support to strengthen teachers' readiness for responsible and effective AI integration in classroom learning.

Keywords: Teacher Readiness; Artificial Intelligence; AI-Based Learning; Digital Transformation; Elementary Education

INTRODUCTION

The rapid development of digital technology is currently occurring at a rapid pace and bringing many changes to the world of education. One of the most visible developments is the emergence of Artificial Intelligence (AI), which is beginning to be used in various fields, including education (Arya et al., 2023)**.** AI is not only used in the industrial or business world, but has also begun to be applied in the classroom as a tool to assist in the learning process (Asbara et al., 2024). In education, AI can be used to help teachers create learning materials, conduct assessments, and support learning systems that can adapt to students' needs (Putra et al., 2025). This change requires teachers to have new readiness to be able to follow the increasingly complex developments in digital education. (Aryani & Darmiany, 2025).

In primary education, this change is crucial because classroom teachers have a key role in shaping students' foundations of knowledge and character (Hanafiah et al., 2024). Teachers not only need to master the subject matter, but must also be able to use learning technology that continues to develop (Fitria et al., 2019). The presence of Artificial Intelligence (AI) in the world of education provides many opportunities to improve the quality of learning, for example making learning more personal, more efficient, and more interactive (Fauzi et al., 2025). However, on the other hand, this development also raises new challenges, especially regarding teachers' readiness to understand and apply this technology in the classroom (Widiansyah et al., 2024).

Several previous studies have shown that the use of digital technology in education has been widely implemented (Azizah & Hendriyani, 2024). This includes internet-based learning media, digital applications, and online learning platforms. However, research specifically addressing teacher readiness to use Artificial Intelligence (AI) at the elementary

school level is still limited (Harsono et al., 2026). Most research discusses the use of digital technology in general, not specifically the use of AI in the learning process (Arly et al., 2023). For example, various studies on digital learning show that teachers generally use technology only as a tool for presentations and searching for information (Aisyah et al., 2024). This technology has not yet been used as an AI-based learning system that can automatically adapt material to students' needs (Nabila et al., 2025).

In a global context, several major publications such as UNESCO (2023) state that the use of Artificial Intelligence (AI) in education has great potential to improve the quality of learning (Sufyan & Kurniawan, 2026). However, this also requires teacher preparedness, particularly in terms of digital literacy and understanding the ethics of technology use. Furthermore, the OECD (2022) report explains that a digital skills gap remains among teachers, and this is one of the main challenges in implementing AI in schools (Rahmadi & Muhammad, 2025). Various studies from international journals also show that the use of AI in education is still in its early stages, especially in developing countries (Shaheda et al., 2025). This condition is caused by limited infrastructure and unequal training for teachers.

A similar situation is also occurring in Indonesia. The shift toward digital education is being driven through various policies, one of which is the implementation of the Independent Curriculum, which emphasizes technology-based learning, creativity, and the use of digital tools in the learning process (Azzahra et al., 2025). However, the application of Artificial Intelligence (AI) specifically in elementary school learning is still relatively rare. Teachers often use technologies such as PowerPoint, instructional videos, and the internet to teach (Widiansyah et al., 2024). Meanwhile, the use of AI such as ChatGPT, learning systems that can adapt to student needs, or other artificial intelligence-based applications is still limited to the personal use of teachers, not yet part of the overall classroom learning process (Ali et al., 2025).

At SDN 08 Panyabungan, initial observations indicate that teachers are beginning to utilize digital technologies such as laptops, projectors, and internet access, and some are already familiar with simple AI applications to prepare materials. However, understanding of AI remains basic, and its application is not yet structured or routine, leaving teachers' readiness at an early stage. This research is important because teachers' role determines the success of AI implementation in learning. More in-depth research is needed to assess teachers' understanding and readiness, the forms of implementation already taking place in

the classroom, and the supporting and inhibiting factors to ensure targeted interventions and training. Initial findings indicate challenges such as limited facilities, uneven digital literacy, and a lack of training, despite student interest and school support. Therefore, teacher capacity building, school policies and government support, and infrastructure are needed to ensure the effective and sustainable implementation of AI-based learning in elementary schools.

METHODS

This study used a qualitative approach to understand classroom teachers' readiness to implement Artificial Intelligence (AI)-based learning at SD N 08 Panyabungan. The qualitative approach was chosen because it focused on exploring teachers' processes, experiences, understandings, and practices—rather than quantitative data—allowing researchers to obtain an in-depth understanding of teachers' understanding of AI, their level of readiness, and their initial use of technology in learning activities.

Data sources consisted of primary data (semi-structured interviews with the principal, fifth-grade teachers, and students; direct observation of the learning process) and secondary data (lesson plans, teaching modules, training notes, and activity documentation). All three collection techniques—observation, interviews, and documentation—were used in combination to complement and strengthen the findings. Data analysis followed the Miles and Huberman model (reduction, presentation, drawing conclusions) and was validated through triangulation of sources, techniques, and time. This procedure ensured the completeness, consistency, and validity of the data, making the findings regarding teachers' readiness to implement AI at SD N 08 Panyabungan more valid and useful for developing technology-based learning.

RESULTS

Construction of Understanding and Readiness of Class Teachers in Implementing Artificial Intelligence (AI)-Based Learning at SD N 08 Panyabungan

The research at SDN 08 Panyabungan aims to determine the understanding and readiness of class teachers in implementing Artificial Intelligence (AI)-based learning; the results show that teachers have utilized digital technology (laptops, projectors, internet, learning applications) to support the learning process, but the use of AI is still in its early stages and is not evenly distributed, even though the school has a digital literacy program,

the application of AI is not yet structured in the curriculum so its use is limited. An interview with a fifth-grade teacher, Mrs. SRN, on March 10, 2026 revealed that AI is becoming known to teachers along with the development of educational technology and the increasing use of digital media. According to her, technological advances have made teachers familiar with various AI-based learning applications and media that help teaching and learning activities to be easier, more interesting, and according to students' needs.

"We are now beginning to understand Artificial Intelligence (AI) technology through various learning applications used in the learning process. For example, we use applications like ChatGPT, Google Bard, and various other digital learning applications that can help us find learning materials, answer questions, and provide easier-to-understand explanations. Furthermore, this technology also helps teachers and students create more engaging learning media, such as presentation materials, summaries, and sample questions. With the use of AI in learning, the learning process becomes more practical, faster, and makes it easier for students to obtain the information they need." (Personnel interview with Mrs. SRN, Grade V Teacher at SD N 08 Panyabungan).

He also explained that Artificial Intelligence (AI) technology is considered capable of assisting teachers in preparing various teaching materials for learning activities. With AI, teachers can more easily search for information, create learning materials, compile questions, and prepare learning media that are more engaging for students. Furthermore, the use of AI is also considered to increase teacher creativity in developing learning methods and media, thus making the teaching and learning process more varied, interactive, and less boring for students.

"AI helps teachers accelerate and enrich the learning process: finding ideas and material references, selecting methods and examples of activities tailored to student needs, quickly creating questions, quizzes, and assessments, and preparing engaging learning media (presentations, images, summaries, and digital materials). The result is more efficient preparation and increased student learning engagement." (Personnel interview with Mrs. SRN, Grade V Teacher at SD N 08 Panyabungan).

Observations show that teachers are already utilizing digital media such as instructional videos, PowerPoint presentations, and the internet to support the learning process, making it more engaging and easier for students to understand. However, the use of Artificial Intelligence (AI) is still limited to teaching aids, such as for searching for references and creating teaching materials, while its use by students is still relatively limited.

Document studies also indicate the use of digital media in learning tools, but the use of AI is still in its early stages.

An interview with the Principal of SD N 08 Panyabungan, Mr. AFL on March 12, 2026 stated that the school supports the use of technology, including Artificial Intelligence, to make learning more effective and interesting. However, teacher readiness varies—some are already proficient, some still need training—so the school holds regular training, discussions, and mentoring as well as strengthening digital literacy so that teachers are more prepared and confident in integrating technology in the teaching and learning process. Observations show that some teachers are already using technological devices such as laptops, projectors, and digital media to support learning, making it more engaging and easier for students to understand. However, some teachers still use conventional methods such as lectures and textbooks. Furthermore, schools have been gradually conducting educational technology training and workshops to improve teachers' skills in using technology, including in supporting the implementation of Artificial Intelligence (AI)-based learning in the future.

An interview with fifth-grade student MRR on March 14, 2026, revealed her experiences in class. She described the teacher's delivery of material, the use of learning media, and her impressions of the learning activities. According to MRR, technology such as videos and images from the internet made learning more engaging, reduced boredom, and facilitated comprehension by providing clear visual illustrations. Another student, APL, shared a similar experience regarding the teaching methods and media used. She highlighted that the teacher taught students how to search for information through applications and the internet, while also providing practical examples to help students understand and become more motivated to learn independently using technology.

Observations showed that some students did not yet directly grasp the concept of Artificial Intelligence (AI) and still needed teacher explanations. However, the use of digital media—videos, presentations, and applications—increased enthusiasm, engagement, and a more positive learning atmosphere compared to conventional methods. An interview with fifth-grade teacher Mrs. SRN revealed obstacles to implementing AI-based learning, including a lack of specialized training, limited facilities and equipment, and varying teacher digital skills. In general, SD N 08 Panyabungan has begun implementing AI through digital media and has shown positive impacts, but it still needs to improve teacher competency and infrastructure so that implementation runs optimally.

Implementation of Artificial Intelligence (AI)-Based Learning in Learning Practices Carried Out by Class Teachers at SD N 08 Panyabungan

This study aims to describe the application of Artificial Intelligence (AI) based learning in teaching and learning activities at SD N 08 Panyabungan, starting from planning, implementation, to evaluation. Observation results show that the learning process has begun to move towards digital through the use of laptops, projectors, the internet, and learning applications, and some teachers have also begun to utilize simple forms of AI such as intelligent search engines and automatic question-making applications although their use is still limited as an aid and has not been fully integrated into learning; document studies show the use of digital media in lesson plans and teaching modules but the application of AI specifically has not been explicitly stated in learning planning; interviews with grade V teachers of SD N 08 Panyabungan, Mrs. SRN on March 15, 2026 revealed that AI technology has begun to be used at the planning stage to help prepare teaching materials, compile learning materials, and prepare learning devices that will be used in class so that the preparation process becomes easier, faster, and more focused and teachers can focus more on designing learning activities that suit students' needs. She said:

"I typically use technology like ChatGPT or internet search engines to help me find ideas for my lessons. With the help of these technologies, I can more easily find inspiration for various teaching methods, examples of learning activities, and materials relevant to the topic. Furthermore, I often use them to create more engaging and varied sample questions and teaching materials. This is very helpful because I don't have to create everything from scratch manually, making the lesson preparation process faster and more efficient. With the help of these technologies, teachers can also more easily adapt learning materials to the needs and abilities of their students. The material presented can be made simpler, clearer, and more appropriate to the students' level of understanding, making the teaching and learning process more effective." (Personnel interview with Mrs. SRN, Grade V Teacher at SD N 08 Panyabungan).

Observations indicate that teachers prepare lessons using laptops and seek online references to support the material and ensure it meets students' needs. A study of lesson plan documents also indicates the use of digital learning resources, but the term Artificial Intelligence (AI) has not been explicitly included as part of the learning strategy.

An interview with the Principal of SD N 08 Panyabungan, Mr. AFL on March 16, 2026, showed that teachers at the school have begun utilizing digital technology in the learning process. According to him, this utilization supports the direction towards Artificial Intelligence (AI)-based learning even though it has not yet been implemented as a structured AI system. The use of digital media helps deliver material, enriches learning resources, and makes learning more interesting and easier for students to understand. He explained:

"In classroom learning activities, teachers have begun to use various technology-based media, such as learning videos, digital presentations, and occasionally use the internet to help explain material to students... This makes students more interested in participating in lessons because the learning atmosphere is more varied and not monotonous, and helps them more easily understand the material being taught" (Personnel interview with Mr. AFL, Principal of SD N 08 Panyabungan).

Observations support this statement that teachers use projectors to display videos, interactive images, and materials from the internet, making explanations clearer and students more engaged than through lectures. Documentary studies also found the use of audiovisual media and digital learning resources as part of active learning strategies. However, it's important to note that students' use of AI remains limited, as technology use is largely facilitated and controlled by teachers, rather than used independently by students.

Interviews with fifth-grade student MRM on March 17, 2026 and another student, APL, corroborate these findings. MRM stated that videos and images from the internet help accelerate understanding because explanations are accompanied by visual displays, making learning more engaging and less boring. APL added that searching for information online fosters independent learning and careful selection of appropriate sources, making the learning process more active and responsible. Both students indicated that digital engagement increases motivation and understanding, although AI skills have not yet developed widely.

From an evaluation perspective, fifth-grade teacher, Mrs. SRN, explained that technology is also beginning to be utilized for creating and processing assessments—for example, searching for sample questions online, using applications to create questions, and monitoring student learning progress. Although evaluations are still dominated by written questions, there has been limited use of digital questions and computer-based question banks. Overall, the implementation of AI at SD N 08 Panyabungan is still in its early stages

and is primarily a support system through devices, the internet, and digital applications, rather than as an integrated system. Teacher competency improvement through training and school policy support is needed so that the use of AI can be more focused and optimal.

Supporting and Inhibiting Factors of Teacher Readiness for AI-Based Learning at SD N 08 Panyabungan

This study aims to determine the supporting and inhibiting factors in classroom teacher readiness to implement Artificial Intelligence (AI)-based learning at SD N 08 Panyabungan, specifically regarding the use of digital technology and AI in the learning process. Observations indicate that teacher readiness varies: some teachers are already accustomed to using laptops, projectors, the internet, and learning applications, while others still employ conventional methods such as lectures and textbooks. Simple uses of AI are beginning to emerge, for example through search engines and test-making applications, but implementation is still in its early stages and uneven.

Documentation studies indicate that schools support teacher competency improvement through digital literacy training and the use of technology-based learning media, but this support has not yet focused on developing specific skills in the field of Artificial Intelligence. The school has provided supporting facilities such as projectors, laptops, and internet access, which facilitate more engaging and interactive material delivery, potentially increasing learning effectiveness, although AI implementation has not been maximized.

An interview with the Principal of SD N 08 Panyabungan, Mr. AFL, on March 18, 2026, explained that teacher readiness is significantly influenced by school support. He stated that the school's role includes providing adequate facilities, guidance and direction, opportunities for training, and good cooperation between the school and teachers. With this support, teachers become more confident, motivated, and prepared to carry out their responsibilities as educators. The principal further added that adaptation to technology tends to be faster among young teachers who are already accustomed to using digital devices and online information resources; they often utilize interactive presentations, instructional videos, and online learning platforms, and assist colleagues who are experiencing difficulties. The school also regularly holds digital media training sessions so that teachers have the opportunity to learn directly, try various applications, and discuss their application in the

classroom. It is hoped that through these efforts, teachers' ability to utilize technology—including the initial steps in implementing AI—will improve, making learning more engaging, effective, and tailored to students' needs.

An interview on March 19, 2026 with a fifth-grade teacher, Mrs. SRN, showed that the main supporting factor for the use of Artificial Intelligence (AI) in learning is the ease of access to technology; she explained that technological developments make it easier for teachers to use digital devices and applications to support the learning process, help find information, compile teaching materials, create learning media, and manage learning activities to be more effective and efficient so that teachers are more assisted and ready to utilize AI, such as when she stated that many applications can help teachers carry out tasks such as searching for learning materials not only relying on books but also digital learning resources, making questions and evaluations easier and faster, and preparing learning media in the form of presentations, videos, and interactive quizzes that increase student interest. In addition, she added that training is very helpful because after practice, teachers become more understanding, more confident, and not afraid to try new technologies in the classroom so that learning becomes more interesting, and the results of observations support this statement, showing that teachers who use technology more often teach with more confidence, deliver material more smoothly, and are more active in utilizing digital media such as interactive presentations, videos, and learning applications so that the learning process becomes more effective and interesting for students.

The interview was conducted on March 20, 2026, with a fifth-grade student, MRR. During the interview, he was asked about his experiences and opinions regarding learning activities at school. The student then provided an explanation based on his feelings and experiences during the learning process in class. His statement is as follows:

"Learning using videos and images makes us more enthusiastic. The material is easier to understand and less boring. With videos, we can immediately see real-life examples or explanations, so we understand more quickly. The images also make the lessons more interesting. Learning like this helps us focus better and doesn't get bored quickly in class." (Personal interview with MRR, a fifth-grade student at SD N 08 Panyabungan).

Additionally, a student named APL shared her experiences and insights regarding the learning topic. She believes that teachers' use of cell phones or projectors makes the presentation more engaging than using books or lectures alone. When material is projected

through a projector, images, text, or videos are clearly visible at the front of the class, making them easier to understand. Cell phone use is also beneficial for displaying supplementary materials, example problems, or relevant learning videos. As a result, the learning atmosphere becomes more lively, students are more focused and enthusiastic, and motivated to follow the lesson through to completion (Interview with APL, Fifth Grade Student at SD N 08 Panyabungan).

Observations support the student's statement, showing that the use of digital media makes students more focused, enthusiastic, and active compared to lectures. However, an interview with the fifth grade teacher, Mrs. SRN, revealed challenges in implementing Artificial Intelligence (AI)-based learning. Some teachers are unfamiliar with using technology—including laptops and supporting applications—and therefore require time, assistance from colleagues, or additional training to adapt to using learning applications, creating presentations, and organizing digital materials in the classroom.

In addition to teacher skill issues, the teacher highlighted infrastructure challenges, particularly unstable internet connections. Network disruptions hampered access to online materials, playback of instructional videos, and use of online platforms, resulting in poor lesson plans and reduced student focus. Observations and document studies also showed uneven use of technology among teachers, with some actively using digital devices while others rarely used them. The school also lacked specific guidelines for AI implementation, resulting in independent use.

The school principal, Mr. AFL, emphasized the limited availability of facilities and infrastructure as the main obstacle: the limited number of technological devices, requiring rotation, hindering their frequency of use in learning. He also emphasized the need to improve teacher skills through regular training and mentoring to ensure more equitable technology adoption. Based on data triangulation (interviews, observations, and document studies), teacher readiness to implement AI-based learning was influenced by supporting factors—school support, training, device availability, and student enthusiasm—as well as inhibiting factors—limited facilities, uneven digital skills, and the lack of specific guidelines. Therefore, ongoing support and improvement of teachers' digital competencies were needed to ensure more effective AI implementation at SD N 08 Panyabungan.

The Relevance and Contribution of Modern Educational Theory to Classroom Teacher Readiness in Implementing Artificial Intelligence-Based Learning at SDN 08 Panyabungan

This study analyzes the relevance and contribution of constructivism, humanism, and progressivism to the readiness of classroom teachers to implement AI-based learning at SD N 08 Panyabungan in the digital era; observations and documents (RPP, modules, school programs) show that learning is starting to be active, interactive, student-centered, emphasizing character, and utilizing digital media and simple AI applications, but the integration of modern educational theory with AI has not been written in the planning so that the implementation of AI is still early and unstructured. An interview with the Principal, AFL on March 21, 2026 confirmed the direction of more active and student-centered learning, encouraging student involvement, independent thinking, and participation.

"At our school, we encourage teachers to make students more active in the learning process. This means that students don't just listen to the teacher's explanations in class, but are also involved in seeking information on their own using existing technology. Teachers strive to guide students to be more independent in their learning, for example by using the internet to search for additional materials, watching learning videos, or accessing other digital learning resources. In this way, students are expected to not only rely on a single source of information, but also be able to explore knowledge from various sources. Furthermore, the use of technology in learning also helps students become more critical and more active in asking questions and discussing in class. The goal is to make the learning process more interactive, interesting, and not only teacher-centered" (Personal interview with Mr. AFL, Principal of SD N 08 Panyabungan).

In addition to the previous explanation, the resource person provided additional information to clarify the direction and implementation of learning at the school. He emphasized the school's efforts to improve the quality of learning to make it more active, effective, and student-centered. Observations demonstrated active student engagement through group discussions, Q&A sessions, and the use of digital media, ensuring students are not merely recipients of information. A study of lesson plan documents supports these findings by demonstrating the use of active methods such as problem-solving and group discussions, which align with the principles of progressivism.

An interview with fifth-grade teacher, Mrs. SRN on March 22, 2026, explained that students understand material more easily when they construct their own knowledge through learning experiences, rather than simply receiving teacher explanations. She emphasized the importance of active student involvement in activities such as experimenting, discussing, and independently discovering concepts to make the learning process more meaningful. Observations and document studies also demonstrated the use of project-based and experiential learning, which strengthen students' in-depth understanding.

On March 23, 2026, an interview with fifth-grade student MRR confirmed the importance of patient presentation of material supported by visual media. MRR stated that videos and images help provide more concrete examples, making teacher explanations easier to understand and creating a more comfortable and engaging learning environment. This opinion is echoed by another student, APL, who emphasized the importance of mutual assistance and respect in group work so that assignments can be completed more effectively. Observations revealed a communicative and caring teacher-student relationship, creating a comfortable learning environment. Documentary studies also identified character-building programs, social skills development, and activities emphasizing empathy and cooperation, fostering mutual respect and collaboration in students during the learning process. The use of digital devices, guided by teachers, allows students to actively seek information and re-explain the material they have learned.

Based on interviews with the principal, teachers, and students, modern educational theories—including progressivism, constructivism, and humanism—play a crucial role in preparing teachers for Artificial Intelligence (AI)-based learning. The principal and teachers emphasized the need to adapt to educational technology, the role of teachers as facilitators, and the use of digital media to make learning more interactive and contextual. These three theories together support teacher readiness in digital transformation so that AI-based learning can take place in a meaningful and student-centered manner.

DISCUSSION

Research at SD N 08 Panyabungan shows that classroom teachers' understanding and readiness to implement Artificial Intelligence (AI)-based learning is still in its early stages. However, the process of adopting AI in learning is already evident through the use of digital technology in teaching and learning activities. This finding also answers the research question

regarding teachers' readiness to understand and implement AI. It is clear that teachers are already familiar with AI in the form of applications such as ChatGPT and intelligent search engines. However, this understanding is still limited to practical use to assist with daily work, not yet reaching a deeper understanding of the concept or pedagogical application in learning. This condition can be understood as the early stage in the digital transformation process of education (early adoption), namely when new technology begins to be used as a learning aid before truly becoming part of a comprehensively integrated learning system.

In theory, the results of this study are in accordance with several previous studies which state that the use of smart technology in elementary education usually starts with the use of simple digital tools first (Sukaryanti et al., 2023). After that, it evolved into more complex uses of Artificial Intelligence (AI). Previous studies have also shown that many elementary school teachers still have limited digital literacy and AI literacy (Imaduddin et al., 2026). Because of this, AI is more often used to assist teachers in preparing lessons, rather than as a direct part of the student learning process in the classroom. Thus, the results of this study align with those of other studies, particularly those that explain that teachers' understanding of AI concepts is still limited. Furthermore, current technology use is still primarily as a teacher assistance tool (Prihantini et al., 2025).

Furthermore, in terms of readiness to implement technology, this study found that the level of teacher readiness varies from one teacher to another. Some teachers are already quite capable of adapting to the use of technology in learning, but others still need training and mentoring to be more prepared. This finding also answers the research question regarding the level of teacher readiness and the reasons why this readiness is not evenly distributed (Putri & Haifaturrahmah, 2025). Scientifically, this difference can be influenced by various factors, such as experience in using digital technology, teacher age, and opportunities to participate in training. These factors also support the technology adoption theory, which explains that a person's readiness to use technology is influenced by their own abilities, perceptions of the technology's benefits, and support from the environment or organization.

The research results also show that the application of Artificial Intelligence (AI) in learning is still carried out indirectly (Auwaliyah et al., 2025). It means that AI is used through various digital media such as the internet, learning videos, and question-making applications, not as a learning system that automatically adapts to students' needs (Sunarko et al., 2025).

These findings answer the research question regarding the application of AI in classroom learning activities. Interpretatively, this condition indicates that AI is still at the stage of embedded technology support, not as a full-fledged AI-driven learning system. These results also align with previous research that found that in many elementary schools, AI has not been fully utilized to tailor learning to each student's needs (Rahayu et al., 2025). On the other hand, AI is still more often used as a tool to help teachers plan and evaluate learning.

From the student's perspective, the research results show that learning using digital technology can increase student interest, motivation, and involvement in the learning process (Sulistyowati & Asriati, 2024). These findings answer the research question regarding the impact of technology and AI use on students. Theoretically, this can be explained through constructivism and progressivism perspectives, which emphasize that learning will be more effective if students are actively involved and learn through real-life experiences. In this way, students not only receive material from the teacher but also participate in the learning process. These results also align with previous research that suggests that the use of digital media and interactive technology can increase elementary school student engagement (Bitu et al., 2024). However, students generally do not fully understand the concept of Artificial Intelligence (AI), even though they have felt the benefits of its use in learning.

Meanwhile, key supporting factors for implementing Artificial Intelligence (AI) in schools include school support, teacher training, and student enthusiasm for learning. Meanwhile, inhibiting factors include limited facilities, unstable internet access, and teachers' digital skills that still need to be improved. These findings address the research question regarding factors influencing teacher readiness to implement AI. Scientifically, this condition can be understood as an imbalance between readiness in terms of facilities and infrastructure (structural readiness) and readiness in terms of skills and culture in using technology (cultural readiness) (Padila et al., 2020). These results are also in line with previous research which states that the success of digital transformation in education is greatly influenced by the readiness of school infrastructure and policies, not only depending on the abilities of each teacher.

In addition, the research results show that modern educational theories such as progressivism, constructivism, and humanism have an important role in supporting teacher readiness in facing Artificial Intelligence (AI)-based learning (Hidayat, 2026). These findings answer the research question of why modern learning approaches can facilitate the

implementation of AI in schools. Explanatory speaking, progressivism theory supports active, experiential learning. Constructivism theory helps students learn through exploration and self-discovery. Meanwhile, humanism theory emphasizes empathy, positive teacher-student relationships, and student character development (Arifin & Ichsan, 2024; Ichsan, 2019; Ichsan et al., 2023).

These three theories, when applied together, form the basis of the learning process, helping teachers more easily adapt to the use of AI technology. These results also align with previous research, which suggests that the use of educational technology will be more effective when combined with a learning approach that focuses on people and the student learning process, rather than solely on the technology itself.

However, there are clear differences with some previous studies. Previous research indicates that in schools with better digital facilities and infrastructure, Artificial Intelligence (AI) is already being used at a more advanced level, for example, in adaptive learning and automated assessments. However, in this study, the use of AI is still in its early stages and has not yet become a core component of the school's learning system. This indicates that the implementation of AI in elementary schools is still limited. This difference also suggests that the condition of elementary schools, particularly in areas with limited infrastructure, is a significant factor influencing the level of AI technology implementation in learning.

Overall, the results of this study indicate that teacher readiness to implement Artificial Intelligence (AI)-based learning is still in the transitional stage, from digital learning to AI-supported learning. This means that the use of AI in learning has begun to develop, but has not yet been fully implemented. This situation demonstrates that this transformation process requires not only improving teachers' ability to use technology but also other support. This support includes strengthening school policies, ongoing training, and developing more equitable digital facilities and infrastructure to ensure optimal use by all teachers.

For further research, this study's results can serve as a basis for broader studies. One such approach is the development of a teacher training model focused on AI literacy. Furthermore, future research could examine the effectiveness of AI use in thematic learning in elementary schools, as well as conducting longitudinal research to assess changes in teacher readiness over time. Furthermore, future research could compare the implementation of AI

across schools with varying geographic locations and facilities. This aims to obtain a more complete picture of the AI-based educational transformation process in Indonesia.

CONCLUSION

Based on the research results, it can be concluded that the research objectives were achieved: teachers at SD N 08 Panyabungan demonstrated an initial understanding of Artificial Intelligence (AI) through the use of digital applications but were still limited in practical use; teacher readiness was still developing and AI implementation in the classroom took place indirectly through digital media such as video and the internet; the application of this technology had a positive impact on student learning interest but was hampered by limited facilities, networks, and teacher training, so that overall AI implementation was still in the early stages of transition to more advanced digital learning. The practical implications of these findings require increasing teacher capacity through digital literacy and AI training, strengthening infrastructure and internet access by schools, clear and sustainable policies from policymakers to support the development of elementary school teacher competencies, and the gradual development of technology use to maintain and enhance student motivation. Because this study was limited to one school, focused on fifth-grade teachers, and used a qualitative approach that described the transition stage rather than full implementation, further research is recommended in more schools using mixed methods, the development of AI-based learning models, AI literacy training programs for teachers, and a longitudinal design to monitor the development of teacher readiness over time.

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